

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P12649MA	<b>FOR FURTHER ACTION</b> <small>See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)</small>	
International application No. PCT/EP 03/03977	International filing date (day/month/year) 16.04.2003	Priority date (day/month/year) 25.04.2002
International Patent Classification (IPC) or both national classification and IPC H04M19/04		
Applicant SONY ERICSSON MOBILE COMMUNICATIONS AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:
  - I  Basis of the opinion
  - II  Priority
  - III  Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV  Lack of unity of invention
  - V  Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI  Certain documents cited
  - VII  Certain defects in the international application
  - VIII  Certain observations on the international application

Date of submission of the demand 03.11.2003	Date of completion of this report 21.07.2004
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**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-3 as originally filed

**Claims, Numbers**

1-14 received on 22.05.2004 with letter of 19.05.2004

**Drawings, Sheets**

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description,      pages:
- the claims,      Nos.:
- the drawings,      sheets:

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5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	2-11,13,14
	No: Claims	1,12
Inventive step (IS)	Yes: Claims	
	No: Claims	1-14
Industrial applicability (IA)	Yes: Claims	1-14
	No: Claims	

2. Citations and explanations

**see separate sheet**

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**Concerning Section V**

1. The following documents (D) are referred to in this written International Preliminary Examination Report:

- D1: US-A-6 023 513 (CASE ELIOT M) 8 February 2000 (2000-02-08)
- D2: PATENT ABSTRACTS OF JAPAN vol. 1997, no. 06, 30 June 1997 (1997-06-30) & JP 09 055634 A (YAMAHA CORP), 25 February 1997 (1997-02-25)
- D3: EP-A-0 994 464 (KONINKL PHILIPS ELECTRONICS NV) 19 April 2000 (2000-04-19)
- D4: EP-A-1 161 076 (KONINKL PHILIPS ELECTRONICS NV) 5 December 2001 (2001-12-05)

- 2.1. Document D1 discloses (see in particular the passages cited in the International Search Report), according to the main features of claim 1, a device for increasing the perceived bandwidth in an audio signal path with limited bandwidth (see for example the abstract), comprising:

- an input terminal for connecting an audio signal (140 in Fig. 11; see also column 5, lines 33-34),
- an output terminal (142, Fig. 11; see also column 5, lines 34-35), and
- a splitter adapted to divide the audio path from the input terminal into two branches (cf. column 5, lines 35 to 38), a first branch (path 146) for passing a first part of the audio signal (see Fig. 11), and a second branch (second path 148) for processing a second part of the audio signal, the second branch comprising means for producing harmonics of the audio signal (see Fig. 11 and column 5, lines 38 to 42); and
- a combiner (154, see Fig. 11) for adding the harmonics produced in the second branch to the first part of the signal in the first branch at the output terminal (see also column 5, lines 42-43),
- wherein the means for producing harmonics comprises a harmonic generator (152, Fig. 11; see also column 5, lines 40 to 42).

Therefore, the device of claim 1 merely differs from that disclosed in D1 in that in the device of claim 1 it is specified that the output terminal is for connecting a speaker unit for generating an acoustic signal and in that the harmonics produced in claim 1 are out-of-band harmonics, whereas the device which is the object of D1 does not explicitly disclose these possibilities.

It is considered that the first difference is a minor implementing detail which is, if not

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explicitly disclosed, clearly suggested and derivable from D1, which insists upon the fact that the device may be utilized at any point in the transmission path (cf. column 1, lines 55 to 58), i.e. also at the very output, just before applying the signal to the speaker, and which also explicitly mentions the suitability of the system disclosed therein for telephony applications and as hearing aids (see the abstract).

Moreover, in the discussion of the prior art (cf. column 1, lines 29 to 41), D1 acknowledges the existence of devices adding harmonics which are outside of the typical 4 KHz bandwidth in order to improve clarity of the signal, and points out that such an approach requires the processing to be performed at the receiver. This is, however, not a problem if, as discussed in the previous passage, the device is going to be implemented to be directly connected to the loudspeaker at the receiving end.

Hence, the person skilled in the art, starting from a device such as that known from D1 and simply trying to implement it, would apply his common sense and general knowledge and would find it obvious to connect the output 142 of the device disclosed in Fig. 11 to a speaker unit and to add out-of-band harmonics in order to further improve the clarity of the received signal, as is known from the prior art, thus arriving, without the need to exercise any inventive activity, at a device which would fall within the terms of the subject-matter of claim 1.

Therefore, the subject-matter of claim 1 does not involve an inventive step, contrary to Article 33(3) PCT.

- 2.2. The same applies if document D2, which discloses all the features of claim 1 except for the speaker unit, is considered as the starting point. It is to be noted that D2 does disclose adding out-of-band harmonics, since the band pass filter 4 has, for example, a frequency range of 20 KHz to 100 KHz (see paragraph 11 of attached computer-generated translation).

Hence, the subject-matter of claim 1 does not involve an inventive step, contrary to Article 33(3) PCT, in the light of the disclosure of D2, taken in combination with the general knowledge of the person skilled in the art.

- 2.3. Furthermore, document D3, cited in the ISR, discloses a device for increasing the perceived bandwidth in an audio signal path with limited bandwidth, comprising all the features of claim 1 (see abstract, Fig. 1 and column 3, line 42 to column 4, line 2; see also column 3, lines 22 to 25), and is thus prejudicial to the novelty of claim 1, contrary

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to Article 33(2) PCT.

3. The additional features set out in the dependent claims 2 to 11 do not seem to add anything of inventive significance to the claims to which they are appended, taking into account the disclosure of the above cited documents D1 to D4, as well as the general knowledge in the art.

Indeed, D1, for example, already discloses the means for producing harmonics comprising a filter (150 in Fig. 11) and an adjustable amplifier (e.g. 108 in Fig. 9, see also column 5, lines 14 to 17), as recited in claim 2. In addition, the filter (high-pass filter 150) disclosed in D1 is arranged to separate the upper portion of the pass band as an input to the harmonic generator (cf. column 5, lines 38 to 42), as in claim 3.

The fact that the harmonic generator comprises a nonlinear circuit, as recited in claim 4, is a generally known feature and is disclosed in any one of documents D1 to D3.

Producing the harmonics by means of a digital signal processor, as in claim 5, is one of the many alternatives immediately available to the person skilled in the art.

Adding second harmonics and even harmonics, as in claims 6 and 7, is disclosed in document D1 (see e.g. Fig. 2 and column 3, lines 40 to 42).

The fact that the audio signal is a ring signal, as in claim 8, or a polyphonic ring signal, as in claim 9, is disclosed in D4 (cf. paragraphs 5, 11 and 26).

The feature of claim 10 that the audio signal is a speech signal is disclosed in documents D1 and D3.

Providing a delay or a phase shift in the first branch, as in claim 11, in order to synchronise the signals at both branches before combining them (since the processing in the second branch might take some non-negligible time) is considered to be an implementation detail which would be readily apparent to a person skilled in the art.

Therefore, the dependent claims 2 to 11, either alone or in combination, cannot be considered to offer a basis for an inventive main claim.

4. With regard to independent claim 12, which is directed to a communication apparatus characterised by including a device according to any one of claims 1 to 8, 10 and 11,

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the arguments set out above under points 2 and 3 apply equally.

Therefore, the subject-matter of claim 12 does not involve an inventive step, Article 33(3) PCT, in the light of documents D1 or D2, taken in combination with the general knowledge of the person skilled in the art, and furthermore it is not novel over document D3.

5. For the reasons set out above (cf. points 2 and 3), independent claim 13, directed to a communication apparatus including a device according to claim 9, does not involve an inventive step (Article 33(3) PCT).
6. Finally, the features of claim 14, dependent on claims 12 or 13, that the communication apparatus is a portable telephone, a pager, a communicator or an electronic organiser, are known, for example, from D3 (cf. column 3, lines 4 to 12) or D4 (see Fig. 1).

**Further remarks**

1. Both independent claims 12 and 13 are directed to a communication apparatus including a device for increasing the perceived bandwidth, respectively according to "any one of claims 1 to 8, 10 and 11" and to "claim 9".

It is to be noted that, since claim 9 is dependent on claim 8, which is dependent on any one of claims 1 to 7, it is also indirectly dependent on claims 1 to 7. Moreover, since claim 11 is dependent on any one of claims 1 to 10, it is also dependent on claim 9.

Thus, they effectively relate to the same subject-matter, and therefore, their subject-matters are of overlapping scope. Hence, claims 12 and 13 do not meet the requirements of Article 6 PCT regarding conciseness of the claims.

2. The applicant's attention is drawn to the fact that the use of the expression "such as" (claim 10) has no limiting effect on the scope of a claim, and therefore, the features to which such expression refers are regarded as entirely optional (see PG-III, 4.6.)
- 3.1. The statement of the invention on pages 1 and 2 should have been brought into agreement with the wording of the claim(s) of broadest scope as finally amended.
- 3.2. In order to meet the requirements of Rule 5.1.(a),(ii) PCT, the relevant prior art, i.e. the documents D1 to D4 noted above, should have been acknowledged by reference and

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briefly discussed in the introductory part of the description.